



## Case report

## Self inflicted death following inhalation and ingestion of Builders Polyurethane expandable foam

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## ABSTRACT

Builders Polyurethane (PU) expandable foam is a product used to fill voids and provide insulation in the building industry. It is easily available from DIY and hardware stores. Other uses include pest control. It can produce fumes, while curing, which can be toxic to humans, or induce asthma and there are reports of polyurethane foam being combustible unless a fire retardant is incorporated. Death due to can explosion when heated has occurred. A literature review revealed one definite case of attempted suicide, one possible attempt by ingestion of Builders PU expandable foam and one accidental non fatal injection of such foam into the lower urinary tract. There is one report of accidental non fatal inhalation of foam. To our knowledge this is the first case of fatal inhalation and ingestion of Builders Polyurethane expandable foam.

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## 1. Introduction

Builders Polyurethane expandable foam is an easily obtainable product used in the building trade to fill voids and provide insulation.<sup>1</sup> It has also been used as a form of pest control of insects and rodents. The foam can be applied using a thin long nozzle and expands to approximately 45 times its can volume. It is fully expanded and cures and sets in around 30 min. It can then be trimmed or over painted after 12–24 h. The following case is a report of a fatality due to the first documented fatality due to deliberate self inhalation and ingestion of Builders Polyurethane expandable foam.

## 2. Case report

## 2.1. History

In May 2009 a 62 year old Caucasian male was found dead in bed at his home address. He was found with white foam around his mouth. A used container of Builders PU expandable foam and its application nozzle together with another full container of said foam were present on a bedside table. The front door of the house was not locked but there was no evidence of disturbance or missing items. A note was present which indicated suicidal intent. Review

of the deceased patient's doctor's notes revealed two previous suicide attempts, a history of depression and alcohol abuse. He was under the supervision of a Psychiatrist. His social history revealed recent severe financial difficulties.

## 2.2. Autopsy findings

Post mortem examination did not reveal any evidence of any external or internal trauma with no marks or bruising to the neck and no defence type injuries to limbs. White foam was found to be occluding and forming a cast of the upper respiratory tract down to the level of small bronchioles. (Fig. 1). Mouth, pharynx, oesophagus and stomach distended by white foam which formed a cast of the stomach. (Fig. 2). No other abnormality found.

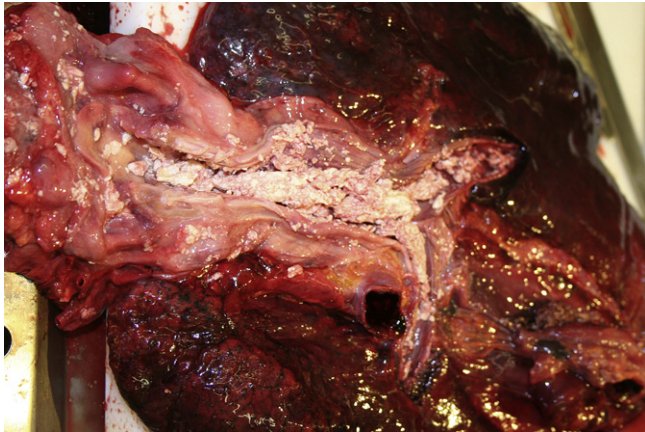
## 3. Discussion

There have been reports of toluene diisocyanate fumes released as Builders polyurethane expandable foam cures proving toxic to humans<sup>2</sup> including precipitation of Asthma<sup>3</sup> and skin and mucosal membrane irritation.

To our knowledge this is the first recorded case of self inflicted death by inhalation and ingestion of Builders (PU) foam. There has been a previous definite case of attempted suicide by such means<sup>4</sup> but the foam entered the stomach not totally occluding the airways and was unsuccessful. There has been a further case reported of accidental injection of said foam into the lower urinary tract.<sup>5</sup> This was not thought to be a deliberate attempt to self harm, did not prove fatal and believed to be an example of experimentation while

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**Fig. 1.** Airways filled and a cast formed by Builders (PU) expandable foam.



**Fig. 2.** Stomach filled and a cast formed by Builders (PU) expandable foam.

under the influence of alcohol. In both the above cases as in this case, it proved possible to inject down narrow passages into stomach and bladder respectively to the extent the foam formed a full perfect case of a hollow organ before the proximal passages became totally obstructed. In all three cases the history and evidence indicated these acts were self inflicted and not inflicted on the deceased by another party. A further non fatal case<sup>6</sup> in which the motive was believed to be self harm details ingestion of polyurethane expandable foam which had allegedly entered the stomach six weeks previously. The patient remained asymptomatic until a fragment of foam migrated into small bowel causing

obstruction requiring surgical retrieval. A plain abdominal X-ray on admission revealed an intragastric cast of self expanding foam. The only report of polyurethane expandable foam entering the lower respiratory tract to any significant degree involves an individual described as an intellectually delayed adult.<sup>7</sup> This presumably accidental inhalation required flexible bronchoscopic removal which ensured recovery. The airway occlusion in this instance was only partial. Although this current case we believe is the first recorded case of death by this method, a review of the internet reveals mention of this as a possible means of deliberate self harm. This mode of death has also been suggested in fictional television programmes such as CSI: NY, CBS Television network first shown in 2006. Season 2. Episode 17 memorably entitled “Necrophilia Americana” albeit the suggestion in this instance was of homicide. Review of the literature has not revealed any real life instance of a homicide by these means.

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The authors have no conflict of interest to declare.

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#### Ethical approved

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#### References

1. Expanding foam, [eHow.co.uk](http://eHow.co.uk).
2. Harris JC, Rumack BH, Aldrich FD. Toxicology of urea formaldehyde and polyurethane foam insulation. *JAMA* 1981 Jan 16;**245**(3):243–6.
3. Dietmann-Moland A, Kopferschmitt-Kubler MC, Meyer PD, Tomb R, Pauli G. Allergic asthma due to domestic use of polyurethane foam. *Lancet* 1991 Oct 12;**338**(8772):953.
4. Van de Putte D, Ceelen W, Gillardin JM, Pattyn P, de-Hemptinne B. Attempted suicide by auto injection of polyurethane (PU) foam; report of a case. *Journal of Trauma-Injury Infection and Critical Care* 2008;**65**(3):E32–3.
5. Edward DK, Moty A, Wilson DD, Zeagler D. Treatment of complete lower urinary tract obstruction secondary to an expandable foam sealant. *Urology* 2002;**60**(1):164 [viii–ix].
6. Medani M, Myers E, Kenny B, Waldron D. Small bowel obstruction secondary to migration of a fragment of lithobezoar: a case report. *Case Journal* 2009;**2**:9155–8.
7. Wager GC, Williams Jr JH. Flexible bronchoscopic removal of radio-occult polyurethane with pneumonitis in a hyperventilated lobe. *American Review of Respiratory Disease* 1990;**142**(5):1222–4.